

**Office de la Propriété  
Intellectuelle  
du Canada**

(11) CA 2 464 102

(13) A1

(12)

(21) 2 464 102

(51) Int. Cl.<sup>7</sup>: G06F 17/60, G06F 13/40

(22) 17.10.2002

(85) 20.04.2004

(86) PCT/US02/033332

(87) WO03/036541

(30) 60/346,235 US 22.10.2001  
10/118,069 US 05.04.2002  
60/396,836 US 16.07.2002

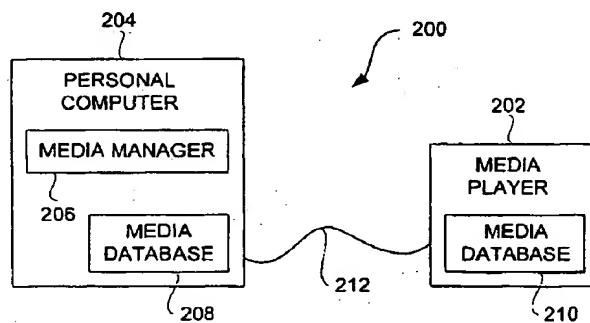
(72) ROBBIN, JEFFREY L. (US).  
HELLER, DAVID (US)

(71) **APPLE COMPUTER, INC.,**  
**1 Infinite Loop**  
**M/S 38-Pat. CUPERTINO, XX (US).**

(74) SIM & MCBURNEY

(54) SYNCHRONISATION INTELLIGENTE POUR UN DIFFUSEUR DE MEDIAS  
(54) INTELLIGENT SYNCHRONIZATION FOR A MEDIA PLAYER

(57) Improved techniques for interaction between a host computer (e.g., personal computer) and a media player are disclosed. According to one aspect, interaction between a host computer and a media player, such as automatic synchronization of media contents stored on a media player with media contents stored on a host computer, can be restricted. In one implementation, a given media player is able to automatically interact only with a designated host computer. According to another aspect, synchronization can be automatically initiated and performed upon connection of a data link between the media player and the host computer. According to still another aspect, synchronization is able to be achieved with a reduced amount of data transfer between the host computer and the media device. According to yet another aspect, management of media items residing on a media player can be performed at and by a host computer for the media player. According to still yet another aspect, media content can be played by a media player in accordance with quality settings established for the media content at the host computer. In one implementation, the quality settings can be established for the media content on a media item by media item basis.





Office de la Propriété  
Intellectuelle

du Canada

Un organisme

d'Industrie Canada

Canadian  
Intellectual Property

Office

An agency of  
Industry Canada

CA 2464102 A1 2003/05/01

(21) 2 464 102

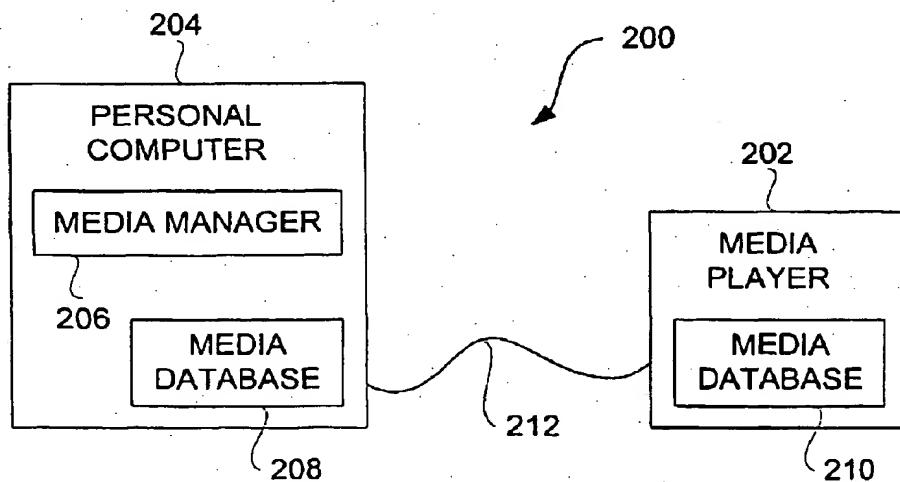
(12) DEMANDE DE BREVET CANADIEN  
CANADIAN PATENT APPLICATION

(13) A1

(86) Date de dépôt PCT/PCT Filing Date: 2002/10/17  
(87) Date publication PCT/PCT Publication Date: 2003/05/01  
(85) Entrée phase nationale/National Entry: 2004/04/20  
(86) N° demande PCT/PCT Application No.: US 2002/033332  
(87) N° publication PCT/PCT Publication No.: 2003/036541  
(30) Priorités/Priorities: 2001/10/22 (60/346,235) US;  
2002/04/05 (10/118,069) US; 2002/07/16 (60/396,836) US

(51) Cl.Int.7/Int.Cl.7 G06F 17/60, G06F 13/40  
(71) Demandeur/Applicant:  
APPLE COMPUTER, INC., US  
(72) Inventeurs/Inventors:  
ROBBIN, JEFFREY L., US;  
HELLER, DAVID, US  
(74) Agent: SIM & MCBURNEY

(54) Titre : SYNCHRONISATION INTELLIGENTE POUR UN DIFFUSEUR DE MEDIAS  
(54) Title: INTELLIGENT SYNCHRONIZATION FOR A MEDIA PLAYER



(57) Abrégé/Abstract:

Improved techniques for interaction between a host computer (e.g., personal computer) and a media player are disclosed. According to one aspect, interaction between a host computer and a media player, such as automatic synchronization of media contents stored on a media player with media contents stored on a host computer, can be restricted. In one implementation, a given media player is able to automatically interact only with a designated host computer. According to another aspect, synchronization can be automatically initiated and performed upon connection of a data link between the media player and the host computer. According to still another aspect, synchronization is able to be achieved with a reduced amount of data transfer between the host computer and the media device. According to yet another aspect, management of media items residing on a media player can be performed at and by a host computer for the media player. According to still yet another aspect, media content can be played by a media player in accordance with quality settings established for the media content at the host computer. In one implementation, the quality settings can be established for the media content on a media item by media item basis.

Canada

<http://opic.gc.ca> · Ottawa-Hull K1A 0C9 · <http://cipo.gc.ca>

OPIC · CIPO 191

OPIC CIPO

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

## **CORRECTED VERSION**

**(19) World Intellectual Property Organization  
International Bureau**



A standard linear barcode is located at the top of the page, spanning most of the width. It is used for document tracking and identification.

(43) International Publication Date  
1 May 2003 (01.05.2003)

PCT

(10) International Publication Number  
**WO 03/036541 A1**

(S1) **International Patent Classification<sup>7</sup>:** G06F 17/60, 13/40

(21) **International Application Number:** PCT/US02/33332

(22) **International Filing Date:** 17 October 2002 (17.10.2002)

(25) **Filing Language:** English

(26) **Publication Language:** English

(30) **Priority Data:**

|            |                              |    |
|------------|------------------------------|----|
| 60/346,235 | 22 October 2001 (22.10.2001) | US |
| 10/118,069 | 5 April 2002 (05.04.2002)    | US |
| 60/396,836 | 16 July 2002 (16.07.2002)    | US |

(71) **Applicant (for all designated States except US):** APPLE COMPUTER, INC. [US/US]; 1 Infinite Loop, MS 3-PAT, Cupertino, CA 95014 (US).

(72) **Inventors; and**

(75) **Inventors/Applicants (for US only):** ROBBIN, Jeffrey, L. [US/US]; 705 Benvenue Avenue, Los Altos, CA 94024

(US). **HELLER, David** [US/US]; 2016 Jonathan Avenue, San Jose, CA 95125 (US).

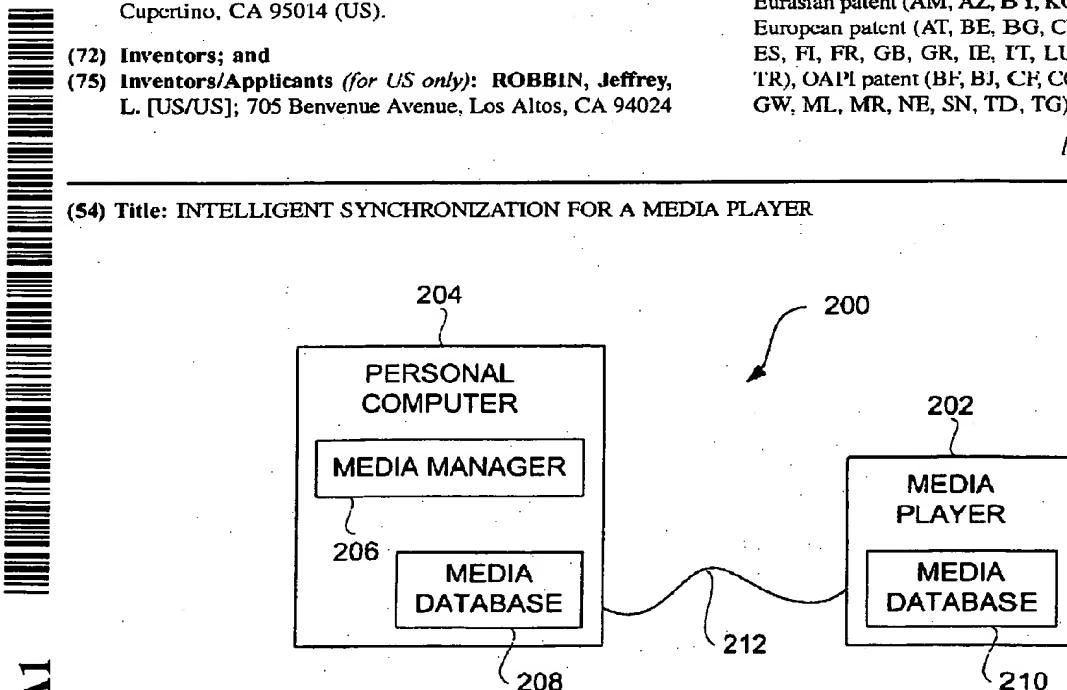
(74) **Agent:** THOMAS, C., Douglass; Beyer Weaver & Thomas LLP, P.O. Box 778, Berkeley, CA 94704 (US).

(81) **Designated States (national):** AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GI, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, L, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SD, SE, SC, SI, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) **Designated States (regional):** ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

[Continued on next page]

**(S4) Title: INTELLIGENT SYNCHRONIZATION FOR A MEDIA PLAYER**



1

**(57) Abstract:** Improved techniques for interaction between a host computer (e.g., personal computer) and a media player are disclosed. According to one aspect, interaction between a host computer and a media player, such as automatic synchronization of media contents stored on a media player with media contents stored on a host computer, can be restricted. In one implementation, a given media player is able to automatically interact only with a designated host computer. According to another aspect, synchronization can be automatically initiated and performed upon connection of a data link between the media player and the host computer. According to still another aspect, synchronization is able to be achieved with a reduced amount of data transfer between the host computer and the media device. According to yet another aspect, management of media items residing on a media player can be performed at and by a host computer for the media player. According to still yet another aspect, media content can be played by a media player in accordance with quality settings established for the media content at the host computer. In one implementation, the quality settings can be established for the media content on a media item basis.

WO 03/036541 A1



**Published:**

— *with international search report*

**(48) Date of publication of this corrected version:**

30 October 2003

*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

**(15) Information about Correction:**

see PCT Gazette No. 44/2003 of 30 October 2003, Section II

## **INTELLIGENT INTERACTION BETWEEN MEDIA PLAYER AND HOST COMPUTER**

### **BACKGROUND OF THE INVENTION**

**[0001]** The present invention relates to media devices and, more particularly, to synchronization or management of media on media devices.

**[0002]** Synchronization operations have been conventionally performed between portable devices, such as Personal Digital Assistants (PDAs) and host computers, to synchronize electronic files or other resources. For example, these files or other resources can pertain to text files, data files, calendar appointments, emails, to-do lists, electronic rolodexes, etc. However, such synchronization schemes tend to utilize filenames and modification dates to determine whether files need to be copied between the devices. These synchronization schemes can be largely automated but nevertheless have to be manually initiated.

**[0003]** In the case of media players, such as MP3 players, files are typically moved between a host computer and a media player through use of a drag and drop operation, like is conventionally done with respect to copying of a data file from a Windows desktop to a floppy disk. Hence, the user of the media player manually initiates the synchronization for individual media items. As a consequence, synchronization tends to be tedious and time consuming for users. Synchronization tends to be slow because data is transmitted between devices over a slow link.

**[0004]** Besides synchronization, management of resources on these portable devices has also been separately performed. For example, a user of a PDA can enter an appointment or a new contact using only the PDA, and then subsequently a host computer could, if desired, be updated (through synchronization) to include identical information. A user can also interact with the host computer to change appointments or contacts, and then subsequently have those changes be reflected on the PDA (through synchronization). As for interaction with the portable devices (e.g., PDAs), the portable devices

normally are small form factor devices so as to be hand-held or pocket-size. Although their small size makes the portable devices convenient to carry, it makes the available screen display size small. Consequently, it is difficult for user to interact with the portable devices to manage resources thereon.

[0005] Thus, there is a need for improved techniques for improved approaches to synchronize or manage media content on host computers and/or media players.

#### SUMMARY OF THE INVENTION

[0006] The invention relates to interaction between a host computer (e.g., personal computer) and a media player. According to one aspect of the invention, interaction between a host computer and a media player, such as automatic synchronization of media contents stored on a media player with media contents stored on a host computer, can be restricted. In one implementation, a given media player is able to automatically interact only with a designated host computer. According to another aspect of the invention, synchronization can be automatically initiated and performed upon connection of a data link between the media player and the host computer. According to still another aspect of the invention, synchronization is able to be achieved with a reduced amount of data transfer between the host computer and the media device. According to yet another aspect of the invention, management of media items residing on a media player can be performed at and by a host computer for the media player. According to still yet another aspect of the invention, media content can be played by a media player in accordance with quality settings established for the media content at the host computer. In one implementation, the quality settings can be established for the media content on a media item by media item basis.

[0007] Other aspects and advantages of the invention will become apparent from the following detailed description taken in conjunction with the accompanying drawings which illustrate, by way of example, the principles of the invention.

### BRIEF DESCRIPTION OF THE DRAWINGS

[0008] The invention will be readily understood by the following detailed description in conjunction with the accompanying drawings, wherein like reference numerals designate like structural elements, and in which:

FIG. 1 is a block diagram of a media management system according to one embodiment of the invention.

FIG. 2 is a block diagram of a media synchronization system according to one embodiment of the invention.

FIG. 3 is a flow diagram of media manager processing according to one embodiment of the invention.

FIG. 4 is flow diagram of synchronization processing according to one embodiment of the invention.

FIGs. 5A and 5B illustrate media device synchronization processing according to one embodiment of the invention.

FIGs. 6A and 6B are flow diagrams of host computer synchronization processing according to one embodiment of the invention.

FIG. 7 is a block diagram of a media management system according to another embodiment of the invention.

FIG. 8 is a flow diagram of automatic synchronization processing according to one embodiment of the invention.

FIG. 9 is a flow diagram of media download processing according to one embodiment of the invention.

FIG. 10 is a flow diagram of media play processing according to one embodiment of the invention.

FIG. 11 is a block diagram of a media player according to one embodiment of the invention.

### DETAILED DESCRIPTION OF THE INVENTION

[0009] The invention relates to interaction between a host computer (e.g., personal computer) and a media player. According to one aspect of the invention, interaction between a host computer and a media player, such as automatic synchronization of media contents stored on a media player with media contents stored on a host computer, can be restricted. In one implementation, a given media player is able to automatically interact only with a designated host computer. According to another aspect of the invention, synchronization can be automatically initiated and performed upon connection of a data link between the media player and the host computer. According to still another aspect of the invention, synchronization is able to be achieved with a reduced amount of data transfer between the host computer and the media device. According to yet another aspect of the invention, management of media items residing on a media player can be performed at and by a host computer for the media player. According to still yet another aspect of the invention, media content can be played by a media player in accordance with quality settings established for the media content at the host computer. In one implementation, the quality settings can be established for the media content on a media item basis.

[0010] According to one embodiment of the invention, the media device is a media player, and the media content on the media player is detailed in a media database residing on the media player. The host computer also stores a media database of the media content on the host computer. Then, on synchronization, the media information stored in the respective media databases can be compared to determine which, if any, media items are to be copied from the host computer to the media player. For example, the media items can pertain to media files for songs, and the media information from the respective databases being compared might include song title, album name and artist name. As a result, the synchronization process is able to be more intelligently performed. Media items can also be removed (or deleted) from the media player if no longer present on the host computer. In other embodiments, media items can additionally or alternatively be copied from the media player to the host computer.

**[0011]** Embodiments of these aspects of the invention are discussed below with reference to FIGs. 1 – 11. However, those skilled in the art will readily appreciate that the detailed description given herein with respect to these figures is for explanatory purposes as the invention extends beyond these limited embodiments.

**[0012]** FIG. 1 is a block diagram of a media management system 100 according to one embodiment of the invention. The media management system 100 includes a media player 102 and a personal computer (host computer) 104. The media player 102 is, for example, a portable, battery-operated device. In one embodiment, the media player 102 is an MP3 player. The personal computer 104 includes a media manager 106. The media manager 106 enables a user of the personal computer 104 to directly manage media content stored on the personal computer 104, and to indirectly manage media content stored on the media player 102. A peripheral cable 108 couples the media player 102 to the personal computer 104. Typically, the peripheral cable 108 couples together data ports provided on the media player 102 and the personal computer 104. In one example, the data ports can be FIREWIRE ports and the peripheral cable 108 can be a FIREWIRE cable. More generally, the peripheral cable 108 acts as a data link. Media items can be transferred from the media player 102 to the personal computer 104 over the peripheral cable 108, and vice versa. For example, the media manager 106 facilitates a user with browsing, adding, deleting, organizing, and other operations with respect to media content (e.g., numerous media items) on the personal computer 104. Additionally, for example, the media manager 106 also facilitates a user with adding and removing media content on the media player 102. In other words, although the media manager 106 resides on the personal computer 104, at least certain management action taken with respect to the media manager 106 can cause the media content at the media player 102 to be similarly managed (e.g., during synchronization).

**[0013]** In one embodiment, the media player is a portable computing device dedicated to processing media such as audio, video or images. For example, the media player 102 can be a music player (e.g., MP3 player), a game player,

a video player, a video recorder, a camera, an image viewer and the like. These devices are generally battery operated and highly portable so as to allow a user to listen to music, play games or video, record video or take pictures wherever the user travels. In one implementation, the media player is a hand-held device that is sized for placement into a pocket or hand of the user. By being hand-held, the media player is relatively small and easily handled and utilized by its user. By being pocket sized, the user does not have to directly carry the device and therefore the device can be taken almost anywhere the user travels (e.g., the user is not limited by carrying a large, bulky and often heavy device, as in a portable computer). Furthermore, the device may be operated by the users hands, no reference surface such as a desktop is needed.

[0014] FIG. 2 is a block diagram of a media synchronization system 200 according to one embodiment of the invention. The media synchronization system 200 can, for example, represent one embodiment of the more general media management system 100 illustrated in FIG. 1. The media synchronization system 200 includes a media player 202 and a personal computer 204. The personal computer 204 includes a media manager 206. The personal computer 204 further includes a media database 208. The media player 202 includes a media database 210. Typically, the media player 202 will also include a data storage device (e.g., disk drive) for storing media content, a cache memory for storing media content in-use, a screen display for displaying information to a user, and a processor (e.g., microprocessor) for controlling operation of the media player 202.

[0015] A peripheral cable 212 provides a data path (or data link) between the media player 202 and the personal computer 204. The peripheral cable 212 provides a peripheral bus that couples the media player 202 to the personal computer 204. The peripheral bus, for example, could be a FIREWIRE bus or a Universal Serial Bus (USB). A synchronization operation between the media content stored on the personal computer and the media content stored on the media player 204 can be achieved in a sophisticated manner through comparison of media information stored in the respective media databases 208 and 210. When comparison of the media information

from the respective databases 208 and 210 indicates that there is a particular media item resident on the personal computer 204 that is not resident on the media player 202, then the particular media item can be transmitted (downloaded) to the media player over the peripheral cable 212. On the other hand, when the comparison of the media information from the respective databases 208 and 210 indicates that a particular media item is resident on the media player 202 but is not resident on the personal computer 204, then the particular media item can be either removed (deleted) from the media player 202 or transmitted (e.g., uploaded) over the peripheral cable 212 to the personal computer 204. Hence, by providing the media player 202 with the media database 210, more sophisticated synchronization and management of media content is enabled.

**[0016]** The media database 210 also allows the media player 202 to present a user interface to the user that is more sophisticated than conventional approaches. Such a user interface can be presented on the screen display of the media player 202. The user interface can, for example, allow the user of the media player 202 to browse, sort, search, play, etc. the media content resident on the media player 202. The user interface can also allow the user of the media player 202 to download (add) or delete (remove) media items from the media player 202. The media manager 206 also has a user interface that allows a user to browse, sort, search, play, make playlists, burn Compact Discs (CDs), etc. the media content resident on the personal computer 204. The user interface can also allow the user of the personal computer 204 to download (add) or delete (remove) media items from the personal computer 204. In one embodiment, the media manager 206 and its associated user interface are provided by iTunes, version 2.0, from Apple Computer, Inc. of Cupertino, California.

**[0017]** FIG. 3 is a flow diagram of media manager processing 300 according to one embodiment of the invention. The media manager processing 300 is, for example, performed by the media manager 106 illustrated in FIG. 1 or the media manager 206 illustrated in FIG. 2.

**[0018]** The media manager processing 300 initially detects 302 a media player connected to a personal computer (host computer). Here, when the media player is connected to the personal computer, a synchronization operation can be performed to synchronize the media content between the media player and the personal computer. After the media player has been detected as being connected to the personal computer, the media content between the media player and the personal computer can be synchronized 304. The synchronization can be performed in a one-way (i.e., uni-directional) manner or in a two-way (i.e., bi-directional) manner. In a preferred embodiment, the synchronization is one-way from the personal computer to the media player. In another embodiment, the synchronization can be one-way from the media player to the personal computer. In still another embodiment, the synchronization can be two-way from the media player to the personal computer as well as from the personal computer to the media player. In any case, the media player typically has less media storage capacity than the personal computer and thus may limit the extent of the synchronization that can be performed. The synchronization processing can be performed manually assuming that a media player has already been detected 302 or automatically upon such detection. In the case of automatic synchronization following detection of the connection, synchronization is performed without a user interacting with any buttons or user interface elements, that is, the connection itself initiates the synchronization.

**[0019]** FIG. 4 is flow diagram of synchronization processing 400 according to one embodiment of the invention. The synchronization processing 400 is, for example, performed by a host computer, such as the personal computer 104 illustrated in FIG. 1 or the personal computer 204 illustrated in FIG. 2. More specifically, the synchronization processing 400 is performed by the media manager 106 illustrated in FIG. 1 or the media manager 206 illustrated in FIG. 2.

**[0020]** The synchronization processing 400 initially reads 402 player media information from a media database on a media player. Next, the player media information is compared 404 with first media information from a media

database on a host computer. Such comparison produces comparison information concerning differences between the player media information and the host media information. Next, the synchronization processing 400 determines 406 one or more media items to copy between the host computer and the media player based on the comparison information. For example, media items (e.g., audio files for songs) can be compared using media information such as song title, album name and/or artist name, which pertain to characteristics or attributes of the media items. Thereafter, the determined one or more media items are copied 408 and the appropriate media database(s) are updated. Following the operation 408, the synchronization processing 400 is complete and ends.

**[0021]** According to one embodiment, the comparison of player media information and host media information is performed using media attributes of the various media items. Namely, a media item on the media player can be deemed the same media item as one resident on the host computer if its media attributes sufficiently match. Examples of media attributes include title, album, track, artist, composer and genre. These attributes are particular to a particular media item. In addition, other media attributes can pertain to quality characteristics of the media item. Examples of such media attributes include bit rate, sample rate, equalization setting, volume adjustment, start/stop and total time. Hence, in one embodiment, if the above-identified media attributes (e.g., title, album, track, artist and composer) pertaining to a media item on the media player all match those same media attributes pertaining to a media item on the host computer, then the two media items stored on different devices can be deemed the same even though still further attributes or characteristics may cause these media items to not be exact duplications of one another. For example, if modification dates associated with files respectively storing the media items were different, this difference in modification date would not trigger the copying of such media items from the host computer to the media player when the above-identified media attributes match.

**[0022]** Hence, the intelligence of the synchronization processing of the invention allows the amount of data transfer to be properly managed such that

it is relatively low or minimized. Although conventional approaches are able to transfer files from a host computer to a portable device, when dealing with media items, filenames and modification dates tend not to be reliable indicators of whether data transfer needs to be transferred (i.e., copied). As a result, using conventional data transfer techniques with respect to media items results in slow and inefficient operation and thus tends to present an unsatisfactory user experience.

**[0023]** Although the synchronization processing 400 makes use of media databases at the host computer and the media player, in another embodiment, the needed host media information and the player media information can be gathered from the media items themselves. In one implementation, such media information can be acquired from metadata provided with the media items. However, by providing the media databases, synchronization is able to be performed more efficiently and quickly.

**[0024]** FIGs. 5A and 5B illustrate media device synchronization processing 500 according to one embodiment of the invention. The media device synchronization processing 500 is performed by a media device that interacts with a host computer over a network. For example, the media device can pertain to the media player 102 illustrated in FIG. 1 or the media player 202 illustrated in FIG. 2.

**[0025]** The media device synchronization processing 500 is generally operative on the media device when the media device is powered on. Initially, a decision 502 determines whether the media device has just been coupled to a bus. The decision 502 can be performed periodically to check for a recent connection to a bus or can be triggered by hardware detection of connection to a bus. The bus is a communication bus coupled to the host computer. In one embodiment, the bus is a serial bus such as FIREWIRE or Universal Serial Bus (USB). When the decision 502 determines that the media device has not just been coupled to a bus, then the media device is operated 504 as a media player. In such a mode, the media device operates to browse, search or play media items for its user. The media items can, for example, be audio items (e.g., songs) that are able to be played. Following the operation 504, the

media device synchronization processing 500 returns to repeat the decision 502 and subsequent operations.

**[0026]** On the other hand, when the decision 502 determines that the media device has just been coupled to the bus, then the media device is placed in a hard disk mode. In the hard disk mode, the media device acts as an external hard drive to the host computer. A decision 508 then determines whether the host computer has requested media attributes for the media items residing on the media device. When the decision 508 determines that the host computer is not requesting media attributes, the media device can, but need not, perform other hard drive operations for non-synchronization purposes (not shown). When the decision 508 determines that the host computer is requesting media attributes (i.e., such as through a read operation), then the media attributes of the media items stored on the media device are retrieved 510. After the media attributes are retrieved 510, the media attributes are forwarded 512 to the host computer.

**[0027]** Next, a decision 514 determines whether new media has been received at the media device from the host computer. In other words, in an effort to synchronize the media content residing on the media device with the media content residing at the host computer, the media device will often receive media content from the host computer. Hence, the decision 514 determines whether new media items have been or are presently being received. When the decision 514 determines that such new media items have not been received, then the media device synchronization processing 500 can await such new media items. While waiting for new media items, the media device can, but need not, perform other hard drive operations for non-synchronization purposes (not shown). More generally, other hard disk operations can occur concurrently with synchronization operations. On the other hand, when the decision 514 determines that new media items have been received from the host computer, then the new media items and their associated media attributes are stored 516 to the media device. In one embodiment, the new media items are stored into files on the media device, and the associated media attributes pertaining to the media items are stored in

a media database residing on the media device. Additionally, any unneeded media items and their associated media attributes can be removed 518 from the media device. Hence, in this embodiment, by synchronizing the media content residing on the media device with that on the host computer, new media items are not only stored to the media device, but unneeded (e.g., old) media items and their associated media attributes are also removed from the media device.

**[0028]** Following the operation 518, a decision 520 determines whether a playlist update has been received. When the decision 520 determines that a playlist update has not been received, then the media device synchronization processing 500 can await such a playlist update. Alternatively, when the decision 520 determines that a playlist update has been received, then an updated playlist for the media device is produced 522. The playlist update could be the updated playlist or could be instructions to update an existing playlist. The updated playlist is then stored 522 to the media device.

**[0029]** In effect, one or more playlists at the host computer can be synchronized with the media device and thus made available to the media device. A playlist identifies particular media items that are to be played in a sequence. Internally, the playlist can be represented in the media database as a data structure that points to files of the appropriate media items residing on the storage device within the media device. Hence, for a given playlist, the pointers to the files of the appropriate media items on the media device will differ from the pointers to the files for the same media items on the host computer, thus the need to update the pointers if a particular playlist is moved between the host computer and the media device.

**[0030]** FIGs. 6A and 6B are flow diagrams of host computer synchronization processing 600 according to one embodiment of the invention. The host computer synchronization processing 600 is, for example, performed by a host computer. The host computer can, for example, be the personal computer 104 illustrated in FIG. 1 or the personal computer 204 illustrated in FIG. 2.

**[0031]** The host computer synchronization processing 600 begins with a decision 602 which monitors a bus (i.e., peripheral bus) to determine whether

any new devices have been attached. In one implementation, the monitoring is limited to a particular category of devices (e.g., FIREWIRE devices). Such monitoring can, for example, be performed by polling the device(s) on the bus or by receiving a new device alert. When the decision 602 determines that no new devices have been attached to the bus, then the host computer synchronization processing 600 awaits the presence of a new device. Once the decision 602 determines that a new device is present on the bus, then the device is set up 604 as a file system with respect to the host computer. As such, an operating system for the host computer is able to access (read, write and delete) files with respect to the file system (i.e., the new device).

[0032] Next, a decision 606 determines whether the device that is now present on the bus is a media device. When the decision 606 determines that the device is not a media device, then other processing 608 can be performed. Such other processing 608 is unrelated to synchronization processing and thus not further described herein. Following the other processing 608, the host computer synchronization processing 600 is complete and ends with synchronization not having been performed.

[0033] On the other hand, when the decision 606 determines that the device is a media device, then media attributes for media items on the media device are requested 610. Typically, the media attributes for all the media items residing on the media device would be retrieved. A decision 612 then determines whether the media attributes have been received. When the decision 612 determines that the media attributes have not yet been received, then the host computer synchronization processing 600 can await their receipt. Once the decision 612 determines that the media attributes have been received, then the media attributes from the media device are compared 614 with media attributes for the media items residing on the host computer. Here, the comparison 614 of media attributes with respect to the media device and the host computer results in comparison information. The comparison information indicates directly or indirectly which media items are present at the host computer but not present at the media device as well as which media items are present at the media device but not present at the host computer.

Following the comparing 614, the media items on the host computer that are not on the media device are identified 616.

**[0034]** Next, a decision 618 determines whether the media device has the capacity to store all the identified media items. Here, the decision 618 determines whether the media device has sufficient storage capacity to store the one or more media items that have been identified 616 as on the host computer but not on the media device. When the decision 618 determines that the media device does not have sufficient capacity, then the number of media items to be stored is limited 620. There are numerous ways to limit the number of media items to be stored. For example, one or more of the media items to be stored can be de-selected (i.e., not selected) such that they are not to be stored to the media device. The one or more media items to be de-selected can be chosen in a variety of different ways. For example, the one or more items to be de-selected could be chosen randomly, chosen based on file size, chosen based on position in playlist, etc. Following the operation 620, the host computer synchronization processing 600 returns to repeat the decision 618 and subsequent operations.

**[0035]** When the decision 618 determines that the media device has sufficient capacity to store all of the identified media items, the identified media items and their associated media attributes are sent to the media device. Here, the remaining identified media items and their associated media attributes are sent (i.e., copied) from the host computer to the media device where they are to be stored. A playlist can also be sent 624 to the media device. The playlist can represent a new playlist or an updated version of a previously existing playlist. Before sending 624 the playlist to the media device, the playlist can be modified for use on the media device. Alternatively, the media device itself could update the playlist for use on the media device.

**[0036]** Additionally, although not illustrated in FIGs. 6A and 6B, according to another embodiment, the host computer synchronization processing 600 at operation 614 can also identify those of the media items on the media device that are not on the host computer. Then, the host computer can operate to interact with the media device to remove (e.g., delete) those media items

stored on the media device that are not stored at the host computer. Such additional processing would be performed after the operation 616 and prior to the decision 618 so that the storage capacity of the media device can be fully utilized.

**[0037]** The media device synchronization processing 500 and the host computer synchronization processing 600 interact to synchronize media items on the media device to those media items on the host computer. Such synchronization can consider all media items or can be limited to synchronizing only a subset of media content, such as media items pertaining to one or more playlists. The media attribute comparison provided by the invention is facilitated through the use of databases, both on the host computer and on the media device.

**[0038]** In one implementation, the host computer synchronization processing 600 can utilize an application resident on the host computer to perform the comparison and updating of the media items and their attributes between the host computer and the media device. One such application is iTunes, version 2.0, produced by Apple Computer, Inc. of Cupertino, CA.

**[0039]** FIG. 7 is a block diagram of a media management system 700 according to another embodiment of the invention. The media management system 700 includes a host computer 702 and a media player 704. The host computer 702 is typically a personal computer. The host computer, among other conventional components, includes a management module 706 which is a software module. The management module 706 provides for centralized management of media items (and/or playlists) not only on the host computer 702 but also on the media player 704. More particularly, the management module 706 manages those media items stored in a media store 708 associated with the host computer 702. The management module 706 also interacts with a media database 710 to store media information associated with the media items stored in the media store 708.

**[0040]** The media information pertains to characteristics or attributes of the media items. For example, in the case of audio or audiovisual media, the media information can include one or more of: title, album, track, artist,

composer and genre. These types of media information are particular to particular media items. In addition, the media information can pertain to quality characteristics of the media items. Examples of quality characteristics of media items can include one or more of: bit rate, sample rate, equalization setting, volume adjustment, start/stop and total time.

**[0041]** Still further, the host computer 702 includes a play module 712. The play module 712 is a software module that can be utilized to play certain media items stored in the media store 708. The play module 712 can also display (on a display screen) or otherwise utilize media information from the media database 710. Typically, the media information of interest corresponds to the media items to be played by the play module 712.

**[0042]** The host computer 702 also includes a communication module 714 that couples to a corresponding communication module 716 within the media player 704. A connection or link 718 removeably couples the communication modules 714 and 716. In one embodiment, the connection or link 718 is a data bus, such as a FIREWIRE bus or USB bus, which is well known in the art.

**[0043]** The media player 704 also includes a media store 720 that stores media items within the media player 704. The media items being stored to the media store 720 are typically received over the connection or link 718 from the host computer 702. More particularly, the management module 706 sends all or certain of those media items residing on the media store 708 over the connection or link 718 to the media store 720 within the media player 704. Additionally, the corresponding media information for the media items that is also delivered to the media player 704 from the host computer 702 can be stored in a media database 722. In this regard, certain media information from the media database 710 within the host computer 702 can be sent to the media database 722 within the media player 704 over the connection or link 718. Still further, playlists identifying certain of the media items can also be sent by the management module 706 over the connection or link 718 to the media store 720 or the media database 722 within the media player 704.

**[0044]** Furthermore, the media player 704 includes a play module 724 that couples to the media store 720 and the media database 722. The play module

724 is a software module that can be utilized to play certain media items stored in the media store 720. The play module 724 can also display (on a display screen) or otherwise utilize media information from the media database 722. Typically, the media information of interest corresponds to the media items to be played by the play module 724.

**[0045]** Hence, in one embodiment, the media player 704 has limited or no capability to manage media items on the media player 704. However, the management module 706 within the host computer 702 can indirectly manage the media items residing on the media player 704. For example, to "add" a media item to the media player 704, the management module 706 serves to identify the media item to be added to the media player 704 from the media store 708 and then causes the identified media item to be delivered to the media player 704. As another example, to "delete" a media item from the media player 704, the management module 706 serves to identify the media item to be deleted from the media store 708 and then causes the identified media item to be deleted from the media player 704. As still another example, if changes (i.e., alterations) to characteristics of a media item were made at the host computer 702 using the management module 706, then such characteristics can also be carried over to the corresponding media item on the media player 704. In one implementation, the additions, deletions and/or changes occur in a batch-like process during synchronization of the media items on the media player 704 with the media items on the host computer 702.

**[0046]** In another embodiment, the media player 704 has limited or no capability to manage playlists on the media player 704. However, the management module 706 within the host computer 702 through management of the playlists residing on the host computer can indirectly manage the playlists residing on the media player 704. In this regard, additions, deletions or changes to playlists can be performed on the host computer 702 and then be carried over to the media player 704 when delivered thereto.

**[0047]** As previously noted, synchronization is a form of media management. The ability to automatically initiate synchronization was also previously discussed. Still further, however, the synchronization between

devices can be restricted so as to prevent automatic synchronization when host computer and media player do not recognize one another.

[0048] FIG. 8 is a flow diagram of automatic synchronization processing 800 according to one embodiment of the invention. The automatic synchronization processing 800 is, for example, performed by a host computer. For example, the host computer can be the personal computer 104 illustrated in FIG. 1, the personal computer 204 illustrated in FIG. 2, the host computer 702 illustrated in FIG. 7, or some other host computer.

[0049] The automatic synchronization processing 800 begins with a decision 802 that determines whether a media player is connected. When the decision 802 determines that a media player is not connected, then the decision 802 causes the automatic synchronization processing 800 to wait for a media player to be connected. Once the decision 802 determines that a media player has been connected, a media player identifier is retrieved 804 from the media player. Then, a synchronized device identifier, which is stored at the host computer, is compared 806 with the media player identifier.

[0050] Next, a decision 808 determines whether the synchronized device identifier matches the media player identifier. When the decision 808 determines that the synchronized device identifier does match the media player identifier, the media items are synchronized 810 between the host computer and the media player. The synchronization of the media items between the host computer and the media player can be performed in a variety of different ways. In one example, the synchronization can perform the operations 402-408 of FIG. 4. In another example, the synchronization can perform the operations 610-624 of FIGs. 6A and 6B. Alternatively, when the decision 808 determines that the synchronized device identifier does not match the media player identifier, the synchronization operation 810 is bypassed.

[0051] Here, the media items between the host computer and the media player are not synchronized because the particular host computer is not designated as the host for the particular media player. In this regard, the media items stored on the media player are protected from inadvertent removal (deletion) during synchronization. For example, the synchronization is typically

performed such that the media items on the host computer are copied to the media player (to the extent not already present) and the media items on the media player but not the host computer are removed. Hence, synchronization (namely, automatic synchronization) is prevented when the identifiers do not signal that the host computer is the proper host. Consequently, the media player synchronizes or not in a more intelligent and user friendly manner. Following the operation 810 or its being bypassed, the automatic synchronization processing 800 is complete and ends.

**[0052]** According to one embodiment, when a media player is first connected to a host computer (or even more generally when matching identifiers are not present), the user of the media player is queried as to whether the user desires to affiliate, assign or lock the media player to the host computer. When the user of the media player elects to affiliate, assign or lock the media player with the host computer, then a pseudo-random identifier is obtained and stored in either the media database or a file within both the host computer and the media player. In one implementation, the identifier is an identifier associated with (e.g., known or generated by) the host computer or its management module and such identifier is sent to and stored in the media player. In another implementation, the identifier is associated with (e.g., known or generated by) the media player and is sent to and stored in a file or media database of the host computer.

**[0053]** FIG. 9 is a flow diagram of media download processing 900 according to one embodiment of the invention. The media download processing 900 is, for example, processing performed by a media player. For example, the media player can be the media player 102 illustrated in FIG. 1, the media player 202 illustrated in FIG. 2, the media player 704 illustrated in FIG. 7, or some other media player.

**[0054]** The media download processing 900 begins with a decision 902 that determines whether new media data has been received. Here, the decision determines whether new media data is being received from a host computer (personal computer). Typically, the new media data would be received at the media player when the host computer downloads media data from the host

computer to the media player. When the decision 902 determines that new media data has not been received, then the media download processing 900 awaits such data.

**[0055]** Once the decision 902 determines that new media data has been received, the media data is stored to the media player. More specifically, the media data being received can include one or both of media item data and media information data. The media information data pertains to attributes or characteristics of the corresponding media items. The media information can vary with application. In one implementation, the media information includes at least descriptive attributes such as song title, album name and artist name. Further, the media information can include quality characteristics for the media items. Examples of such quality characteristics include bit rate, sample rate, equalization setting, volume adjustment, start/stop and total time.

**[0056]** In any case, the new media data is processed by the media download processing 900 as follows. The media item data is stored 904 to a media store associated with the media player. The media item data pertains to one or more media items. Further, the media information data associated with the one or more media items is stored 906 to a media database. The media database is also associated with the media player. Following the operation 906, the media download processing 900 is complete and ends.

**[0057]** Equalization settings pertain to amplitude settings for a plurality of different frequency bands, as is commonplace with an equalizer. These settings can be set by a user or can be set from selection of one of a plurality of predetermined equalization settings. These equalization settings, whether predetermined or customized, enable the adjustment of the dynamic range of the player device to match the style of music one is listening to. Further, the equalizer settings utilized on the host computer side can be linked to corresponding equalizer settings on the media player side. In one embodiment, each of the equalization settings that are stored within the media database can pertain to a single media item. As an example, when the media items are songs or audio files, the equalization settings can be provided for each song or audio file. More generally, there can be a one-to-one

correspondence between quality characteristics (e.g., equalization settings) and media items such that, when played, each media item would be played in accordance with its own corresponding quality characteristics. Hence, the quality characteristics can be provided on a media item by media item basis.

[0058] As previously noted, one quality characteristic of the media information is equalization settings. In one embodiment, the host computer and/or the media player provide predetermined equalization settings that are identified by a descriptive name. Hence, a user can simply select one of the descriptive names to choose the associated equalizer settings. Table 1 below provides examples of various equalization settings that are predetermined and identified by descriptive names.

| EQUALIZER PRESETS |  |
|-------------------|--|
| ACCOUSTIC         |  |
| BASS BOOSTER      |  |
| BASS REDUCER      |  |
| CLASSICAL         |  |
| DANCE             |  |
| DEEP              |  |
| ELECTRONIC        |  |
| FLAT              |  |
| HIP HOP           |  |
| JAZZ              |  |
| LATIN             |  |
| LOUNGE            |  |
| PIANO             |  |
| POP               |  |
| R&B               |  |
| ROCK              |  |
| SMALL SPEAKERS    |  |
| SPOKEN WORD       |  |
| TREBLE BOOSTER    |  |
| TREBLE REDUCER    |  |
| VOCAL BOOSTER     |  |

[0059] FIG. 10 is a flow diagram of media play processing 1000 according to one embodiment of the invention. The media play processing 1000 is, for example, performed by a media player, such as the media player 102 illustrated in FIG. 1, the media player 202 illustrated in FIG. 2, the media player 700 illustrated in FIG. 7, or some other media player.

[0060] The media play processing 1000 begins with a decision 1002 that determines whether a play request has been received. Here, a play request is typically initiated by a user of the media device. Hence, when the decision 1002 determines that a play request has not yet been received, the media play processing 1000 awaits such a request. When the decision 1002 determines that a play request has been received, the media play processing 1000 then retrieves 1004 at least a portion of the media information for the media item to be played. Here, the media information can vary as to its purposes and thus only a portion of the media information may be useful for playing the media item.

[0061] After the media information has been retrieved 1004, the media player is configured 1006 in accordance with one or more of the quality characteristics of the media information. Here, to the extent that the one or more quality characteristics of the media information can be used to configure the media player, the media player is so configured 1006. For example, in the case of equalization settings, the media player can be configured to operate its internal amplifier in accordance with the equalization settings provided by the quality characteristics associated with the media item to be played.

[0062] Subsequently, the media item data is streamed 1008 to an output device. For example, the streaming 1008 can cause the media item data to be retrieved from a local media store and directed to an output device (e.g., speaker and/or display screen) of the media player. The streaming 1008 of the media item data to the output device operates to produce a media output (audio and/or video) that results by playing the media item. Given that the media information is provided to the media player by the host computer, the media information set or configured for media items at the host computer is able to also be used in playing the media items on the media player.

[0063] Next, a decision 1010 determines whether a quality characteristic has changed. Typically, the decision 1010 can be activated when a user interacts with a Graphical User Interface (GUI) associated with the media player to manually change a quality characteristic for the media item being played. For example, a user could interact with a GUI for the media player to

change the equalization settings. This could be on a per-media item or per-media player basis. Hence, when the decision 1010 determines that a quality characteristic has been changed, the media play processing 1000 can return to repeat the operation 1006 and subsequent operations. At this point, the media player can be reconfigured in accordance with the updated quality characteristics and then the media item can continue to thereafter be played in accordance with the updated quality characteristics. Such an implementation allows the user of the media player to manually alter the quality characteristics for the media player, overall or for a particular media item. However, it should be noted that the ability of the user to make manual changes to the quality characteristics can be restricted. For example, in one embodiment, quality characteristic settings provided by the host computer can override manual user settings.

**[0064]** On the other hand, when the decision 1010 determines that the quality characteristics have not changed, then a decision 1012 determines whether the media play processing 1000 is completed. When the decision 1012 determines that the media play processing 1000 has not completed, then the media play processing 1000 returns to repeat the operation 1008 and subsequent operations. Alternatively, when the decision 1012 determines that the media play processing 1000 has completed, then the media play processing 1000 is complete and ends.

**[0065]** FIG. 11 is a block diagram of a media player 1100 according to one embodiment of the invention. The media player 1100 includes a processor 1102 that pertains to a microprocessor or controller for controlling the overall operation of the media player 1100. The media player 1100 stores media data pertaining to media items in a file system 1104 and a cache 1106. The file system 1104 is, typically, a storage disk or a plurality of disks. The file system 1104 typically provides high capacity storage capability for the media player 1100. However, since the access time to the file system 1104 is relatively slow, the media player 1100 can also include a cache 1106. The cache 1106 is, for example, Random-Access Memory (RAM) provided by semiconductor memory. The relative access time to the cache 1106 is substantially shorter

than for the file system 1104. However, the cache 1106 does not have the large storage capacity of the file system 1104. Further, the file system 1104, when active, consumes more power than does the cache 1106. The power consumption is often a concern when the media player 1100 is a portable media player that is powered by a battery (not shown). The media player 1100 also includes a RAM 1120 and a Read-Only Memory (ROM) 1122. The ROM 1122 can store programs, utilities or processes to be executed in a non-volatile manner. The RAM 1120 provides volatile data storage, such as for the cache 1106.

**[0066]** The media player 1100 also includes a user input device 1108 that allows a user of the media player 1100 to interact with the media player 1100. For example, the user input device 1108 can take a variety of forms, such as a button, keypad, dial, etc. Still further, the media player 1100 includes a display 1110 (screen display) that can be controlled by the processor 1102 to display information to the user. A data bus 1111 can facilitate data transfer between at least the file system 1104, the cache 1106, the processor 1102, and the CODEC 1112.

**[0067]** In one embodiment, the media player 1100 serves to store a plurality of media items (e.g., songs) in the file system 1104. When a user desires to have the media player play a particular media item, a list of available media items is displayed on the display 1110. Then, using the user input device 1108, a user can select one of the available media items. The processor 1102, upon receiving a selection of a particular media item, supplies the media data (e.g., audio file) for the particular media item to a coder/decoder (CODEC) 1112. The CODEC 1112 then produces analog output signals for a speaker 1114. The speaker 1114 can be a speaker internal to the media player 1100 or external to the media player 1100. For example, headphones or earphones that connect to the media player 1100 would be considered an external speaker.

**[0068]** The media player 1100 also includes a bus interface 1116 that couples to a data link 1118. The data link 1118 allows the media player 1100 to couple to a host computer.

**[0069]** Although the media items of emphasis in several of the above embodiments were audio items (e.g., audio files or songs), the media items are not limited to audio items. For example, the media item can alternatively pertain to videos (e.g., movies) or images (e.g., photos).

**[0070]** The above discussion references FIREWIRE cable or bus. FIREWIRE is a trade name of Apple Computer, Inc. for such a cable or bus in accordance with IEEE Standard1394. Hence, FIREWIRE cable or bus refers to IEEE 1394 cable or bus.

**[0071]** The various aspects, embodiments, implementations or features of the invention can be used separately or in any combination.

**[0072]** The invention is preferably implemented by software, but can also be implemented in hardware or a combination of hardware and software. The invention can also be embodied as computer readable code on a computer readable medium. The computer readable medium is any data storage device that can store data which can thereafter be read by a computer system. Examples of the computer readable medium include read-only memory, random-access memory, CD-ROMs, DVDs, magnetic tape, optical data storage devices, and carrier waves. The computer readable medium can also be distributed over network-coupled computer systems so that the computer readable code is stored and executed in a distributed fashion.

**[0073]** The advantages of the invention are numerous. Different aspects, embodiments or implementations may yield one or more of the following advantages. One advantage of the invention is that a user is able to manage (e.g., synchronize) a media player with a host computer in a more sophisticated manner. Another advantage of the invention is that quality characteristics are able to be transferred along with media content from host computer to media player such that media is able to be played by the media player as it was configured to be played at the host computer. Still another advantage of the invention is that synchronization can not only be automatically initiated but also restricted to situations where a media player and a host computer recognize one another.

**[0074]** The many features and advantages of the present invention are apparent from the written description and, thus, it is intended by the appended claims to cover all such features and advantages of the invention. Further, since numerous modifications and changes will readily occur to those skilled in the art, the invention should not be limited to the exact construction and operation as illustrated and described. Hence, all suitable modifications and equivalents may be resorted to as falling within the scope of the invention.

**CLAIMS*****What is claimed is:***

1. A method for synchronizing media contents of a media player with a host computer, said method comprising:
  - 5 detecting connection of a media player to the host computer; and synchronizing media content between the media player and the host computer.
- 10 2. A method as recited in claim 1, wherein the connection is provided by a data link between the media player and the host computer.
- 15 3. A method as recited in claim 1, wherein said synchronizing is based on a comparison of the player media information with the host media information.
4. A method as recited in claim 1, wherein the media player is a portable media player.
- 20 5. A method as recited in claim 1, wherein the media player comprises an audio player, and wherein the media content includes at least audio files of songs.
6. A method as recited in claim 1, wherein the media player comprises a video player, and wherein the media content includes at least video files of videos.

7. A method as recited in claim 1, wherein the media player comprises an image viewer, and wherein the media content includes at least image files of images.
- 5 8. A method as recited in claim 1, wherein said synchronizing of the media content between the media player and the host computer is automatically performed once the connection of the media player to the host computer has been detected.
- 10 9. A method as recited in claim 1, wherein the media player includes a first media database storing player media information, and wherein the host computer includes a second media database storing host media information.
- 15 10. A method as recited in claim 9, wherein said synchronizing comprises:
  - reading the player media information from the first media database provided on the media player;
  - comparing the player media information with the host media information from the second media database provided on the host computer, said comparing producing comparison information;
  - 20 determining which media items are to be copied between the media player and the host computer based on the comparison information; and
  - copying the determined media items to perform the synchronization.
11. A method as recited in claim 10, wherein said method further comprises:
  - 25 identifying media items to be removed from the media player based on the comparison information; and
  - removing the identified media items from the media player.

12. A method as recited in claim 11, wherein the identified media items are those media items on the media player but not on the host computer.
13. A method as recited in claim 10, wherein said method further comprises:
  - 5 updating one or both of the first and second media databases.
14. A method as recited in claim 10, wherein said comparing operates to compare at least song title, album name and artist name.
- 10 15. A method as recited in claim 14, wherein said comparing operates to further compare quality characteristics of media items.
- 15 16. A method as recited in claim 15, wherein the quality characteristics include at least one of bit rate, sample rate, equalization setting, volume adjustment, start/stop and total time.
17. A method as recited in claim 10, wherein the media player is a pocket-sized media player.
- 20 18. A method as recited in claim 10, wherein the media player is an MP3 player, and wherein the media items include at least audio files of songs.
19. A method as recited in claim 1, wherein the media player stores player media information, and the host computer stores host media information.
- 25 20. A method as recited in claim 19, wherein said synchronizing comprises:
  - reading the player media information from the media player;

comparing the player media information with the host media information from the host computer to produce comparison information;

determining which media items are to be copied between the media player and the host computer based on the comparison information; and

5 copying the determined media items to perform the synchronization.

20. A method as recited in claim 19, wherein the play media information and the host media information pertain to attributes of the media items.

10 21. A method as recited in claim 19, wherein the attributes include at least song title, album name and artist name.

22. A method as recited in claim 21, wherein the attributes further include quality characteristics.

15 23. A method as recited in claim 22, wherein the quality characteristics include at least one of bit rate, sample rate, equalization setting, volume adjustment, start/stop and total time.

20 24. A method as recited in claim 19, wherein said synchronizing further comprises:

identifying media items that are to be removed from the media player based on the comparison information; and

removing the identified media items from the media player.

25 25. A method as recited in claim 24, wherein the identified media items are those media items on the media player but not on the host computer.

26. A method as recited in claim 24, wherein the play media information and the host media information pertain to attributes and quality characteristics of the media items.
- 5 27. A method as recited in claim 26, wherein the attributes include at least song title, album name and artist name, and wherein the quality characteristics include at least one of bit rate, sample rate, equalization setting, volume adjustment, start/stop and total time.
- 10 28. A portable media player, comprising:
  - a storage disk that stores a plurality of media items;
  - a user input device that enables a user of said portable media player to at least select a particular media item from the plurality of media items;
  - a cache memory capable of storing at least one of the media items;
  - 15 a media database that stores characteristics information for the media items stored to said storage disk and said cache memory; and
  - a processor operatively connected to said storage disk, said user input device, said cache memory and said media database, said processor controls said portable media player to store, remove and play the media items.
- 20 29. A portable media player as recited in claim 28, wherein said portable media player is battery-operated.
- 25 30. A portable media player as recited in claim 29, wherein said portable media player is an audio player, and wherein the media items are songs.
31. A media player wherein the improvement comprises a media database provided within said media player, the media database storing media information about media items stored on said media player.

32. A media player as recited in claim 31, wherein said media player is a handheld media player, and wherein the media items are audio items.

5 33.. A method for synchronizing media items of a media player with a host computer, the media player storing player media information, and the host computer storing host media information, said method comprising:

retrieving a media player identifier from the media player;

10 comparing the media player identifier with a synchronized device identifier stored at the host computer to produce first comparison information;

determining whether synchronization of the media player with the host computer should be performed based on the first comparison information; and

15 automatically synchronizing the media player with the host computer when said determining determines that synchronization of the media player with the host computer should be performed.

34. A method as recited in claim 33, wherein the first comparison information indicates whether or not the media player identifier matches the synchronization identifier.

20

35. A method as recited in claim 33,

wherein said determining determines that synchronization of the media player should be performed when the first comparison information indicates that the media player identifier matches the synchronization identifier, and

25 wherein said determining determines that synchronization of the media player should not be performed when the first comparison information indicates that the media player identifier does not match the synchronization identifier.

36. A method as recited in claim 35, wherein said synchronizing of the media player with the host computer is automatically performed when said determining determines that the media player identifier matches the synchronization identifier.

5

37. A method as recited in claim 36, wherein said synchronizing of the media player with the host computer is not performed when said determining determines that the media player identifier does not match the synchronization identifier.

10

38. A method as recited in claim 35, wherein said method further comprises:  
querying a user of the media player as to whether the media player should be assigned to the host computer while unassigning any previously assigned media players when said determining determines that the media player identifier does not match the synchronization identifier.

15

39. A method as recited in claim 38, wherein said method further comprises:  
assigning the media player to the host computer when said querying determines that the media player should be assigned to the host computer.

20

40. A method as recited in claim 39, wherein said assigning stores a newly assigned media player identifier in the media player.

25

41. A method as recited in claim 39, wherein said assigning comprises:  
obtaining, at the host computer, an assigned identifier for the media player; and  
storing the assigned identifier in the media player as the media player identifier.

42. A method as recited in claim 39, wherein said assigning comprises:  
obtaining, at the media player, an assigned identifier for the host computer; and  
storing the assigned identifier at the host computer as the synchronization identifier.

43. A method as recited in claim 33, wherein said synchronizing of the media player with the host computer comprises:  
reading the player media information from the media player;  
comparing the player media information with the host media information from the host computer to produce media comparison information;  
determining which media items are to be copied between the media player and the host computer based on the media comparison information; and  
copying the determined media items to perform the synchronization.

44. A method as recited in claim 43, wherein the player media information and the host media information pertain to attributes or quality characteristics of the media items.

45. A method as recited in claim 43, wherein the attributes include at least song title, album name and artist name.

46. A method as recited in claim 45, wherein the quality characteristics include at least one of: bit rate, sample rate, equalization setting, volume adjustment, start/stop and total time.

47. A method as recited in claim 43, wherein said method further comprises:

identifying media items that are to be removed from the media player based on the media comparison information; and

removing the identified media items from the media player.

5 48. A method as recited in claim 47, wherein the identified media items are those media items on the media player but not on the host computer.

10 49. A method as recited in claim 47, wherein the player media information and the host media information pertain to attributes and quality characteristics of the media items.

15 50. A method as recited in claim 49, wherein the attributes include at least song title, album name and artist name, and wherein the quality characteristics include at least one of bit rate, sample rate, equalization setting, volume adjustment, start/stop and total time.

51. A method as recited in claim 33,

20 wherein the media player has a first media database storing player media information, and the host computer has a second media database storing host media information, and

wherein said copying comprises:

reading the player media information from the first media database provided on the media player;

25 comparing the player media information with the host media information from the second media database provided on the host computer, said comparing producing comparison information;

determining which media items are to be copied between the media player and the host computer based on the comparison information; and

copying the determined media items to perform the synchronization.

52. A method as recited in claim 51, wherein said method further comprises:
  - 5 updating one or both of the first and second media databases.
  
53. A computer readable medium including at least computer program code for synchronizing media items of a media player with a host computer, the media player storing player media information, and the host computer storing host media information, said computer readable medium comprising:
  - 10 computer program code for retrieving a media player identifier from the media player;
  - 15 computer program code for comparing the media player identifier with a synchronized device identifier stored at the host computer to produce first comparison information;
  - computer program code for determining whether synchronization of the media player with the host computer should be performed based on the first comparison information; and
  - 20 computer program code for automatically synchronizing the media player with the host computer when said computer program code for determining determines that synchronization of the media player with the host computer should be performed.
  
54. A computer readable medium as recited in claim 53, wherein said computer program code for automatically synchronizing of the media player with the host computer comprises:
  - 25 computer program code for reading the player media information from the media player;

computer program code for comparing the player media information with the host media information from the host computer to produce media comparison information;

5 computer program code for determining which media items are to be copied between the media player and the host computer based on the media comparison information; and

computer program code for copying the determined media items to perform the synchronization.

10 55. A system for managing and playing media data, said system comprising:

a host computer that stores a plurality of media items and at least a first playlist, the first playlist being created by a user interacting with said host computer to select certain of the media items to be included within the first playlist; and

15 a portable media player that, when operatively connected to said host computer, receives media data for one or more of the media items from said host computer and stores the received media data, and receives at least the first playlist from said host computer and stores the first playlist.

20 56. A system as recited in claim 55, wherein said media player includes a hard drive that stores the media items and the first playlist being received from said host computer.

25 57. A system as recited in claim 55, wherein said host computer is used to manage the media items on both said host computer and said portable media player.

58. A system as recited in claim 57, wherein the media items stored on said portable media player are synchronized with the media items stored on said

host computer when said portable media player operatively connects with said host computer.

59. A system as recited in claim 55,

5 wherein said host computer includes at least a management module and a play module, and

wherein said portable media player includes at least a play module but not a management module.

10 60. A system as recited in claim 59, wherein said management module allows a user to add and remove media items from said host computer.

15 61. A system as recited in claim 60, wherein media items are automatically added or removed from said portable media player once said portable media player connects with said host computer.

20 62. A system as recited in claim 61, wherein said management module operates to synchronize media items between said portable media player and said host computer once said portable media player connects with said host computer.

25 63. A system as recited in claim 62, wherein said portable media player includes a media database storing player media information, and wherein said host computer includes a media database storing host media information.

64. A system as recited in claim 63, wherein the synchronization of the media items between said portable media player and said host computer is based on a comparison of the player media information with the host media information.

65. A system as recited in claim 59, wherein said management module allows a user to add and remove media items or playlists from said host computer.

5

66. A system as recited in claim 55, wherein media items or playlists are added or removed from said portable media player once said portable media player connects with said host computer.

10 67. A system as recited in claim 66, wherein said management module operates to synchronize media items or playlists between said portable media player and said host computer once said portable media player connects with said host computer.

15 68. A system for managing and playing media data, said system comprising:  
a host computer including at least a management module for managing a plurality of media items, a host play module for playing the media items for a user of said host computer, and a host media store for storing a plurality of media items; and

20 a portable media player including at least a player media store for storing a plurality of media items, and a player play module for playing the media items stored in said media store for a user of said portable media player, and

wherein said portable media player lacks a management module.

25

69. A system as recited in claim 68, wherein, when said portable media player is operatively connected to said host computer, said portable media player receives media data for one or more of the media items from said host computer and stores the received media data in said player media store.

70. A system as recited in claim 69, wherein said player media store comprises a hard drive that stores the media items.

5 71. A system as recited in claim 69, wherein said management module allows a user to add and remove media items from said host computer.

10 72. A system as recited in claim 71, wherein said management module operates to synchronize media items between said portable media player and said host computer once said portable media player connects with said host computer.

15 73. A system as recited in claim 72, wherein said portable media player includes a player media database storing player media information, and wherein said host computer includes a host media database storing host media information.

20 74. A system as recited in claim 73, wherein the synchronization of the media items between said portable media player and said host computer is based on a comparison of the player media information with the host media information.

25 75. A method for transferring media content from a host computer to a portable media player, the host computer storing media item data and media information data for each of a plurality of media items, said method comprising:

connecting the portable media player to the host computer; and  
transferring the media item data and the media information data for one or more media items from the host computer to the portable media player.

76. A method as recited in claim 75, wherein at least a portion of the media information data being transferred is user-specified at the host computer.

77. A method as recited in claim 75, wherein the media information data includes at least quality characteristics for playing of the media items.

78. A method as recited in claim 77, wherein the quality characteristics include at least one of equalization settings and volume settings.

10 79. A method as recited in claim 75, wherein the media information data includes at least one equalization setting for each of one or more of the media items being transferred from the host computer to the portable media player.

15 80. A method as recited in claim 79, wherein, before being transferred to the portable media player, the at least one equalization setting for each of the one or more media items are user-specified at the host computer.

20 81. A method as recited in claim 80, wherein the equalization settings are user-specified by selection of one of a plurality of predetermined equalization settings.

25 82. A method as recited in claim 80, wherein the equalization settings are user-specified by specifying particular amplitude levels for a plurality of different frequency ranges.

83. A method as recited in claim 80, wherein said method further comprises: thereafter playing a particular one of the one or more media items on the portable media player using the at least one equalization setting corresponding

to the particular one of the one or more of the media items that have been transferred from the host computer to the portable media player.

84. A method as recited in claim 75, wherein the media player includes a media store and a player media database, and wherein the media item data is stored in the media store and the media attribute data is stored to the player media database.

85. A method for playing a media item on a media player, said method comprising:

retrieving at least a portion of media information for the media item to be played, the media information and media item data for the media item previously being transmitted to and stored in the media player, the media information including at least quality characteristics associated with the media item;

---

configuring the media player in accordance with the quality characteristics associated with the media item; and

thereafter playing the media item on the media player as configured.

20

1/12

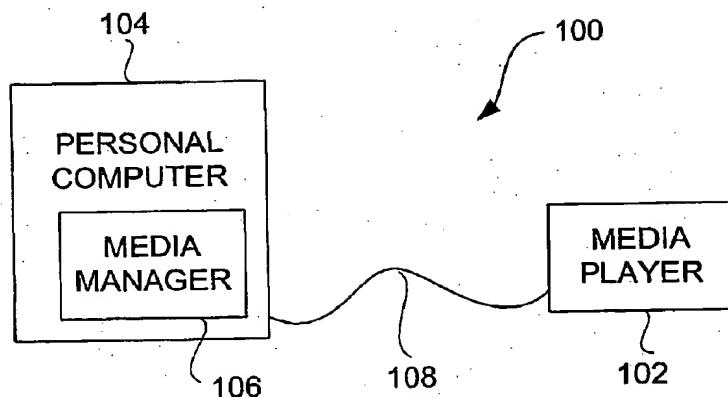


FIG. 1

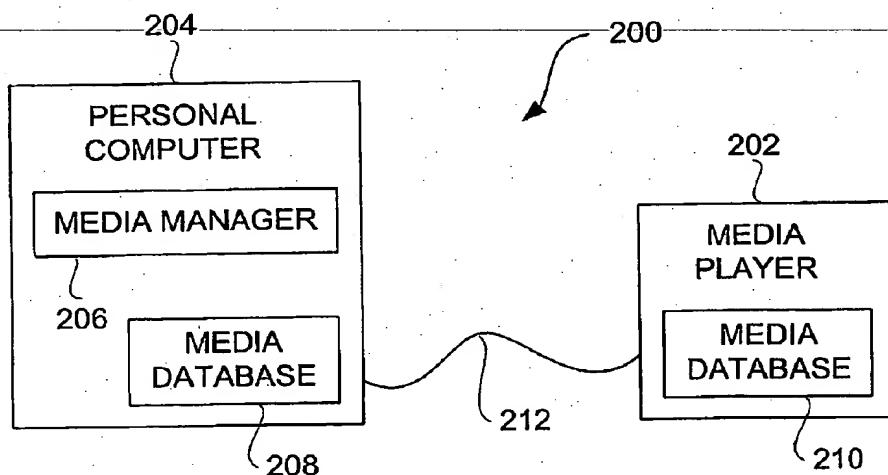


FIG. 2

BEST AVAILABLE COPY

2/12

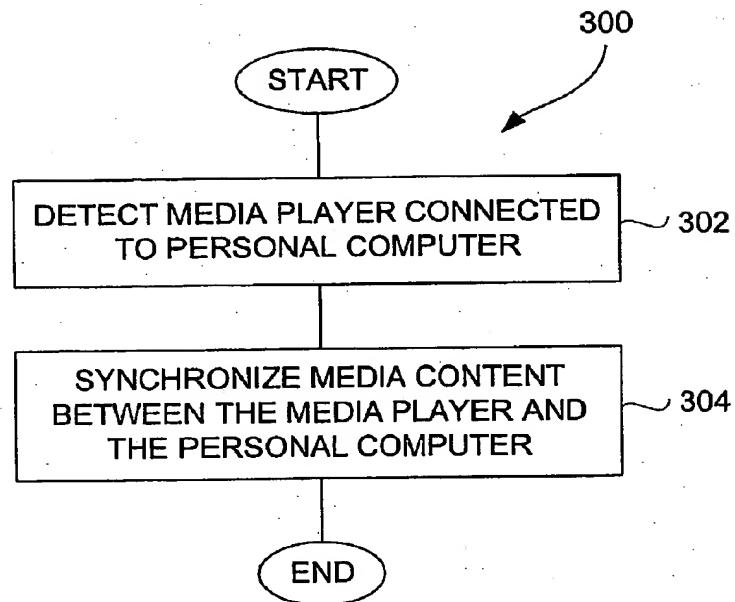


FIG. 3

3/12

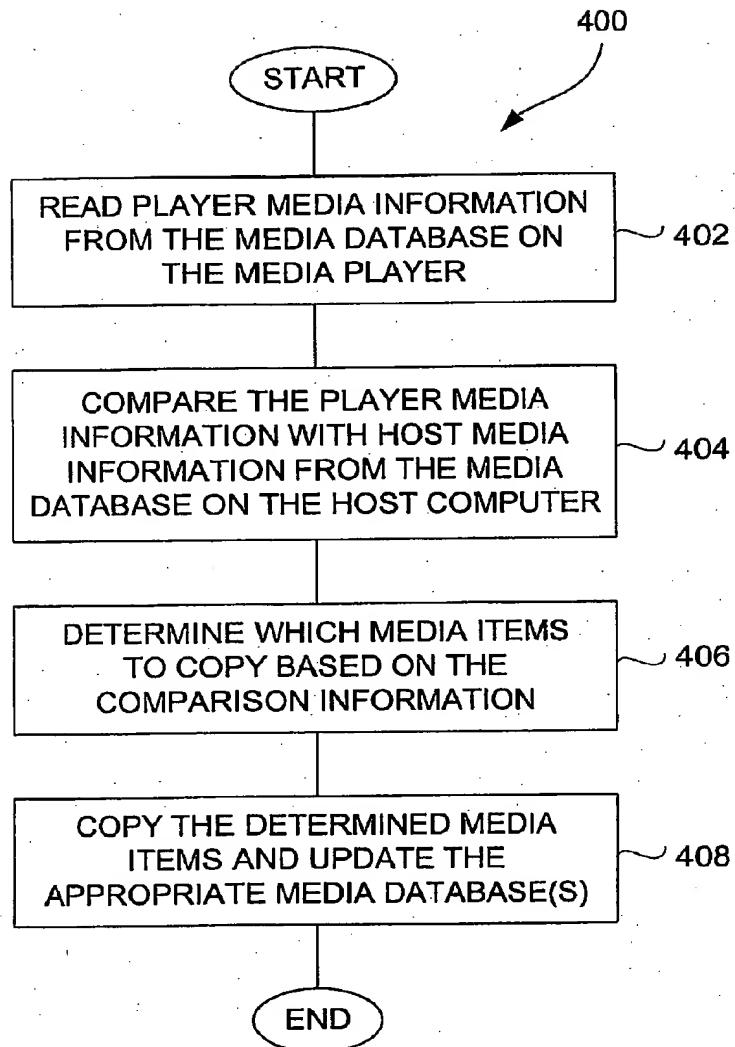


FIG. 4

4/12

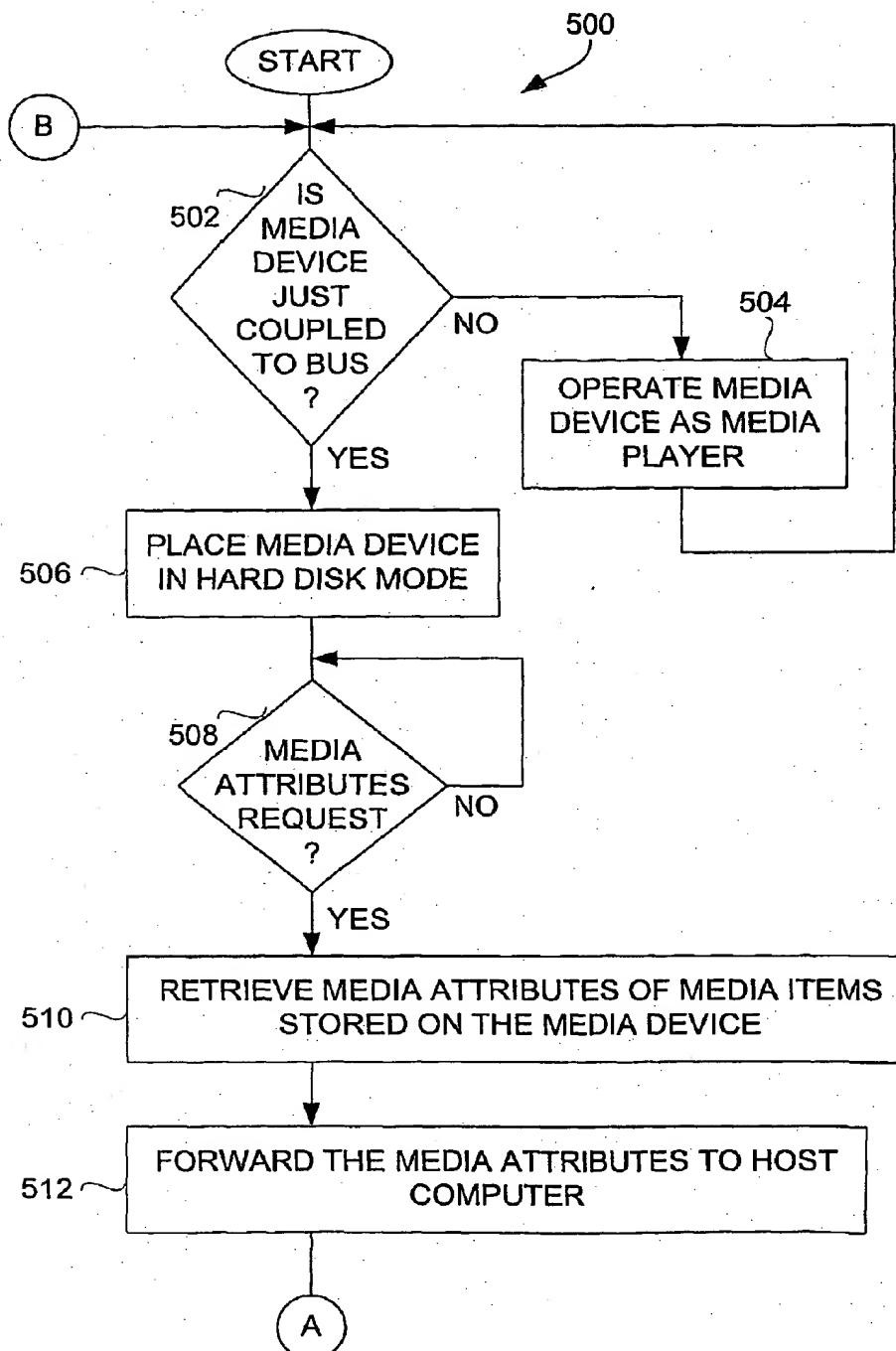


FIG. 5A

5/12

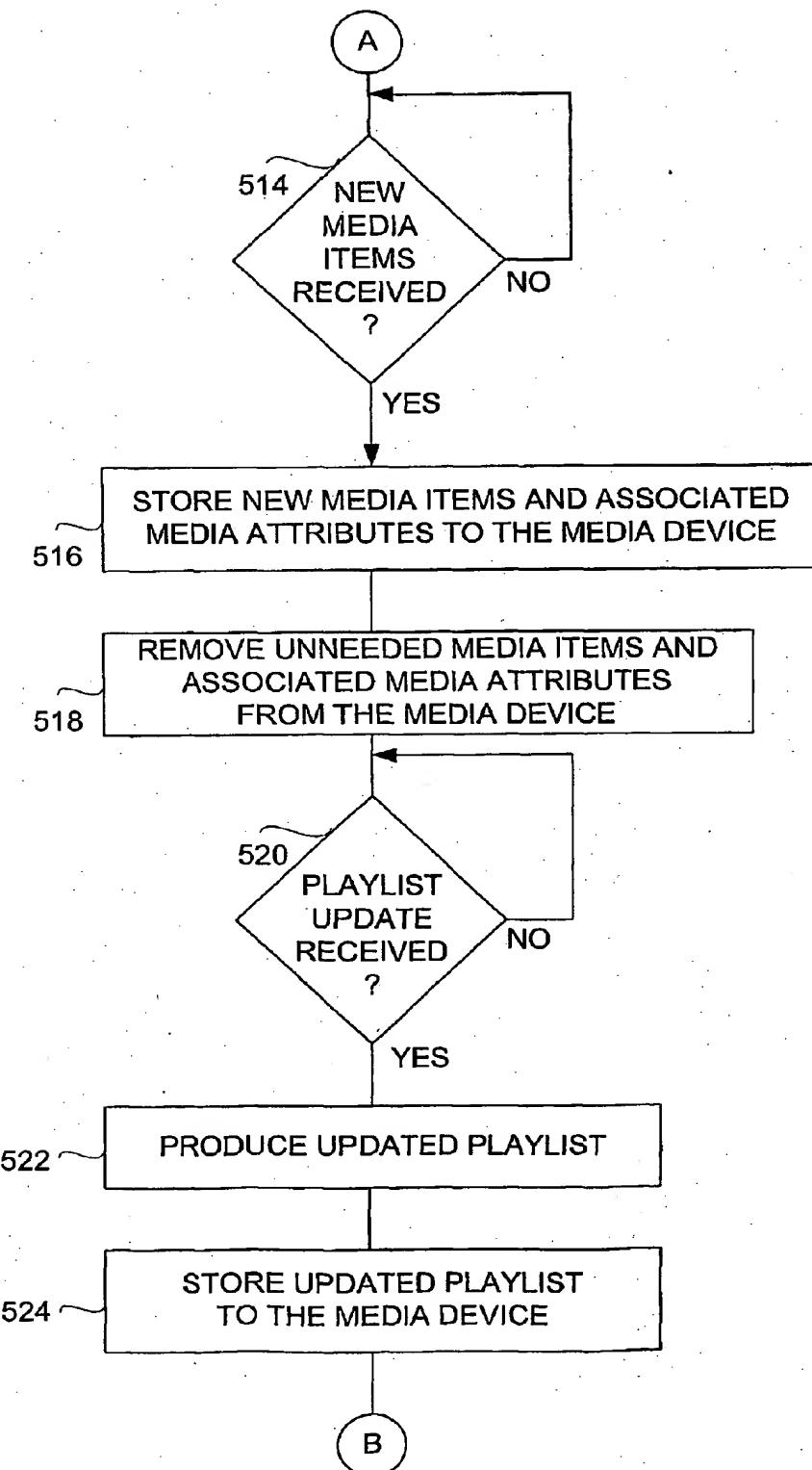


FIG. 5B

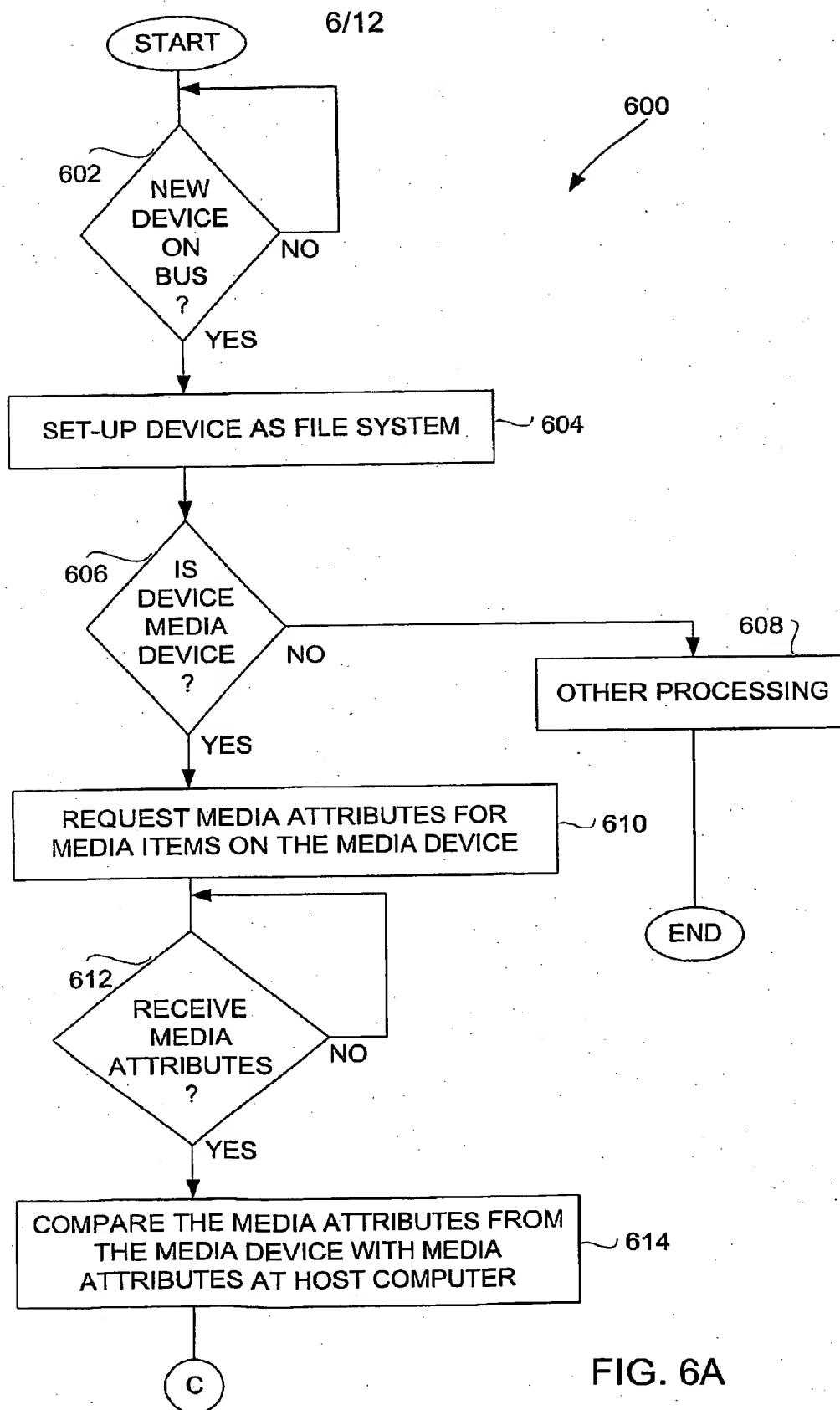


FIG. 6A

7/12

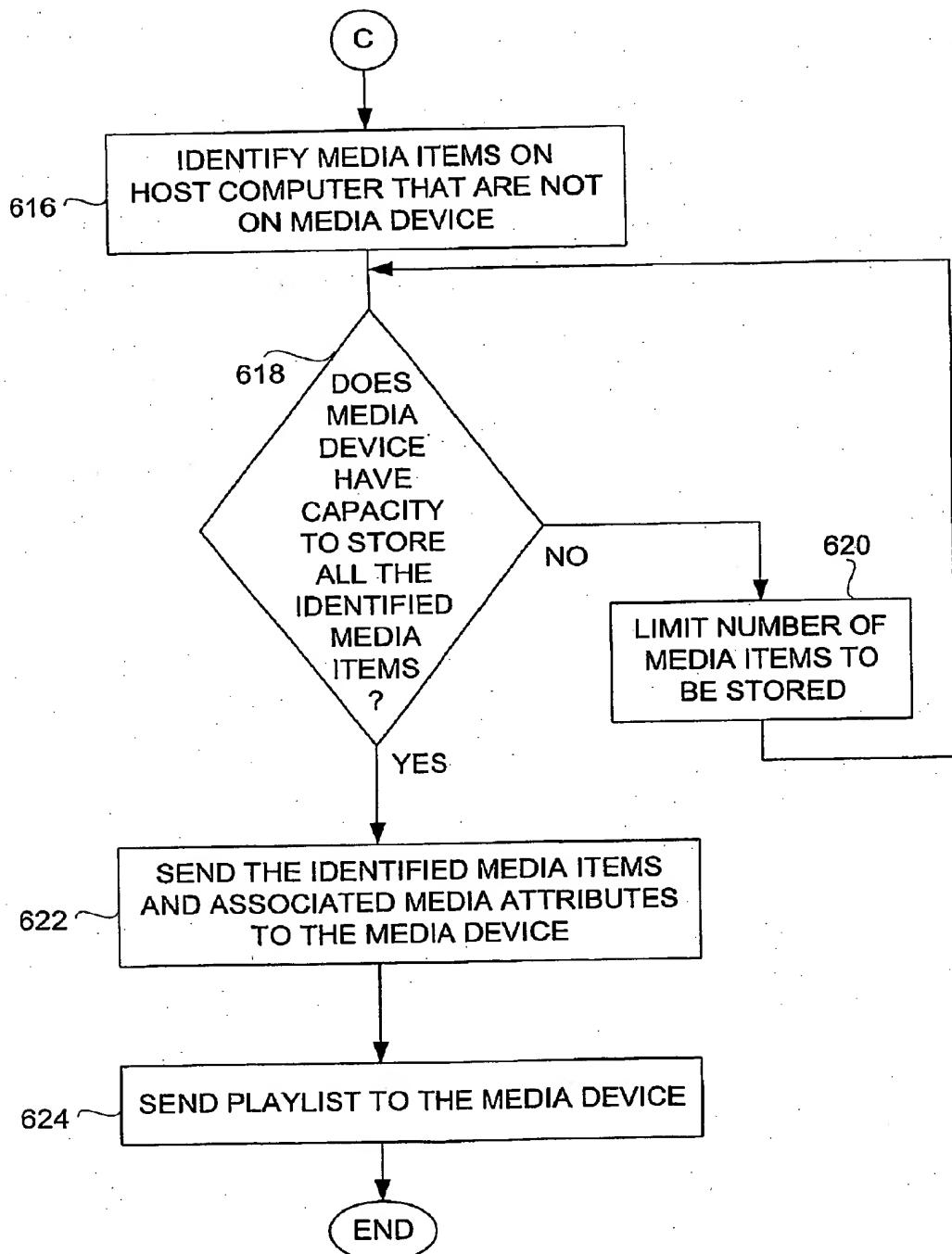


FIG. 6B

8/12

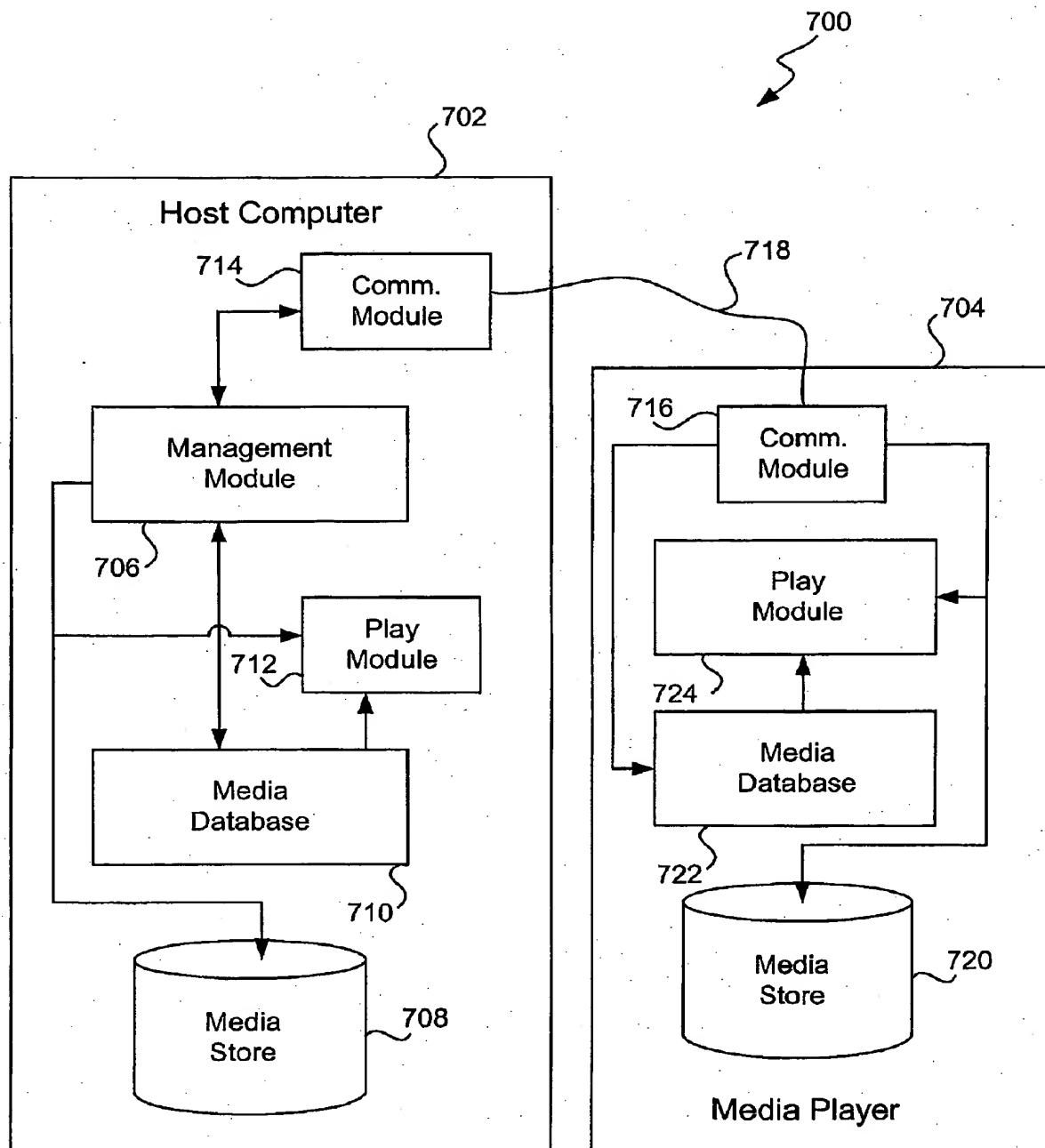


FIG. 7

9/12

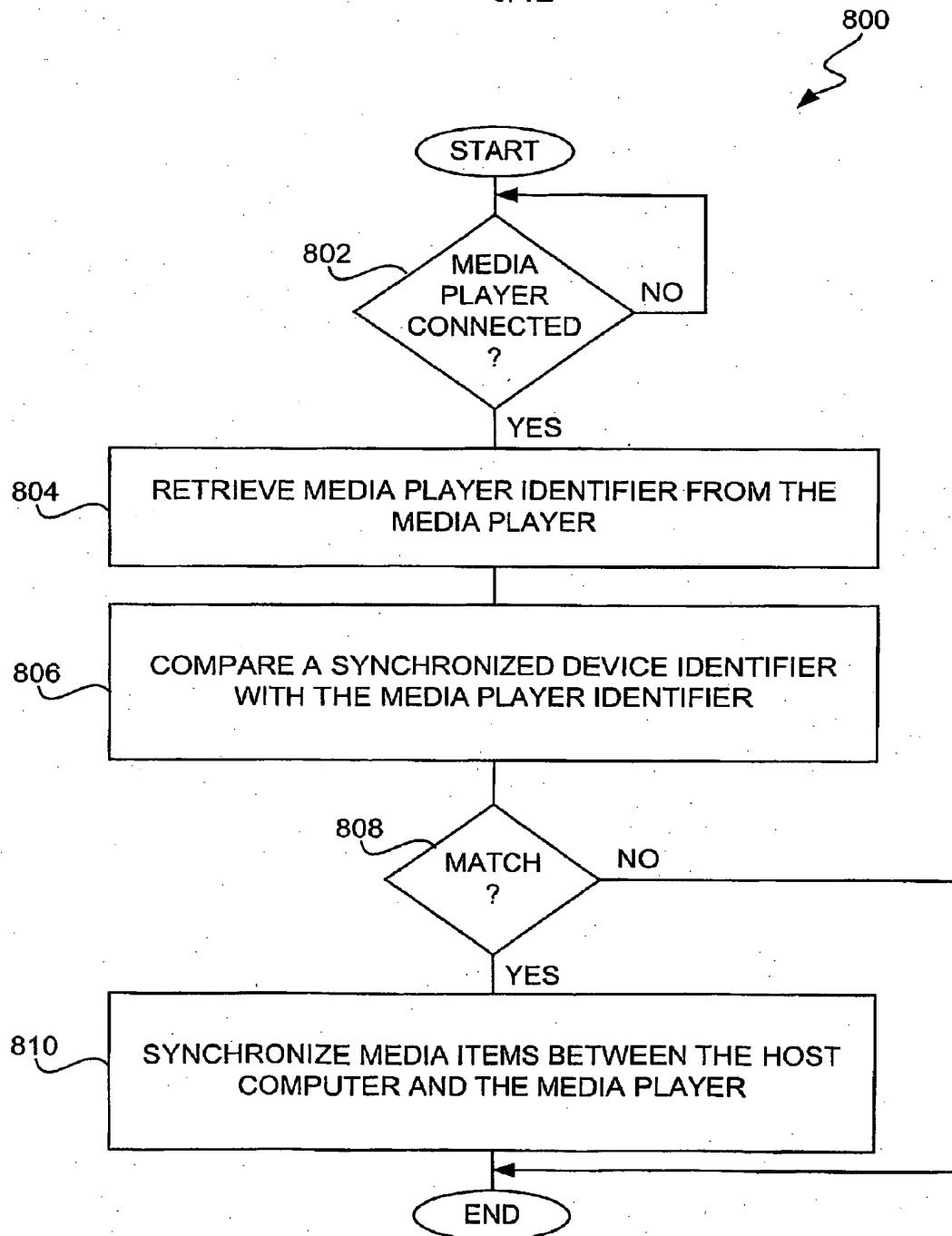


FIG. 8

10/12

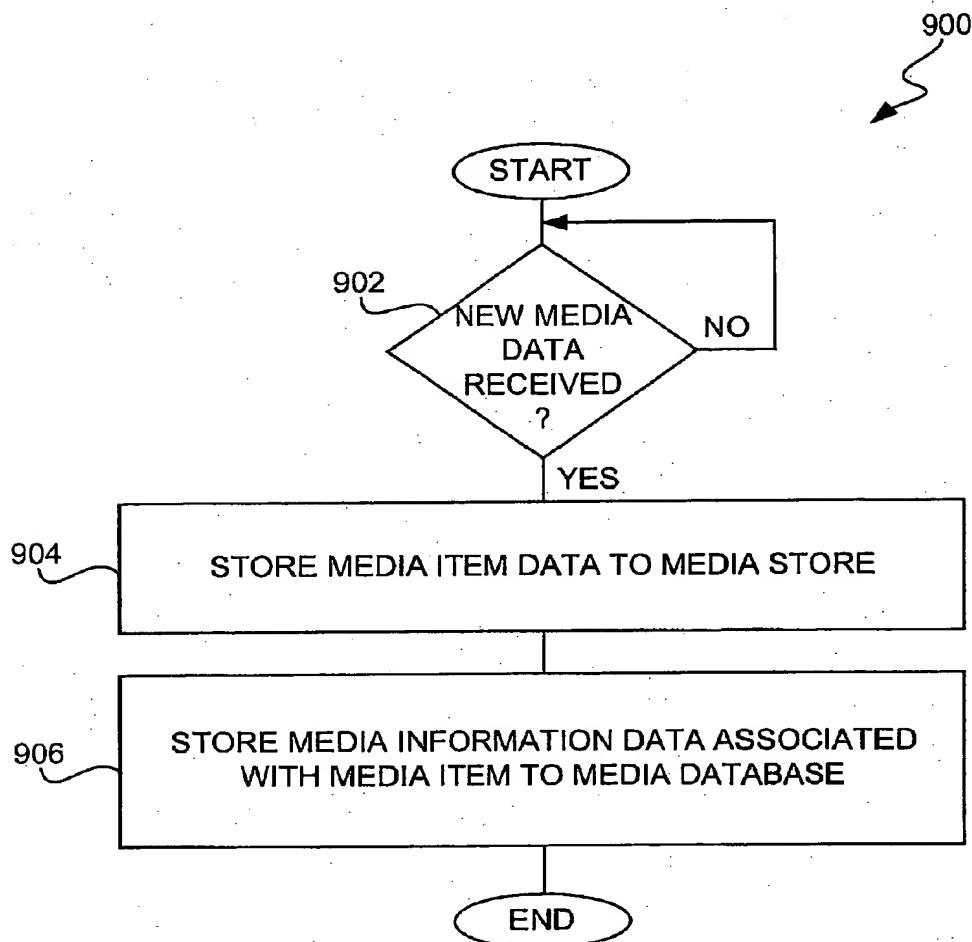


FIG. 9

11/12

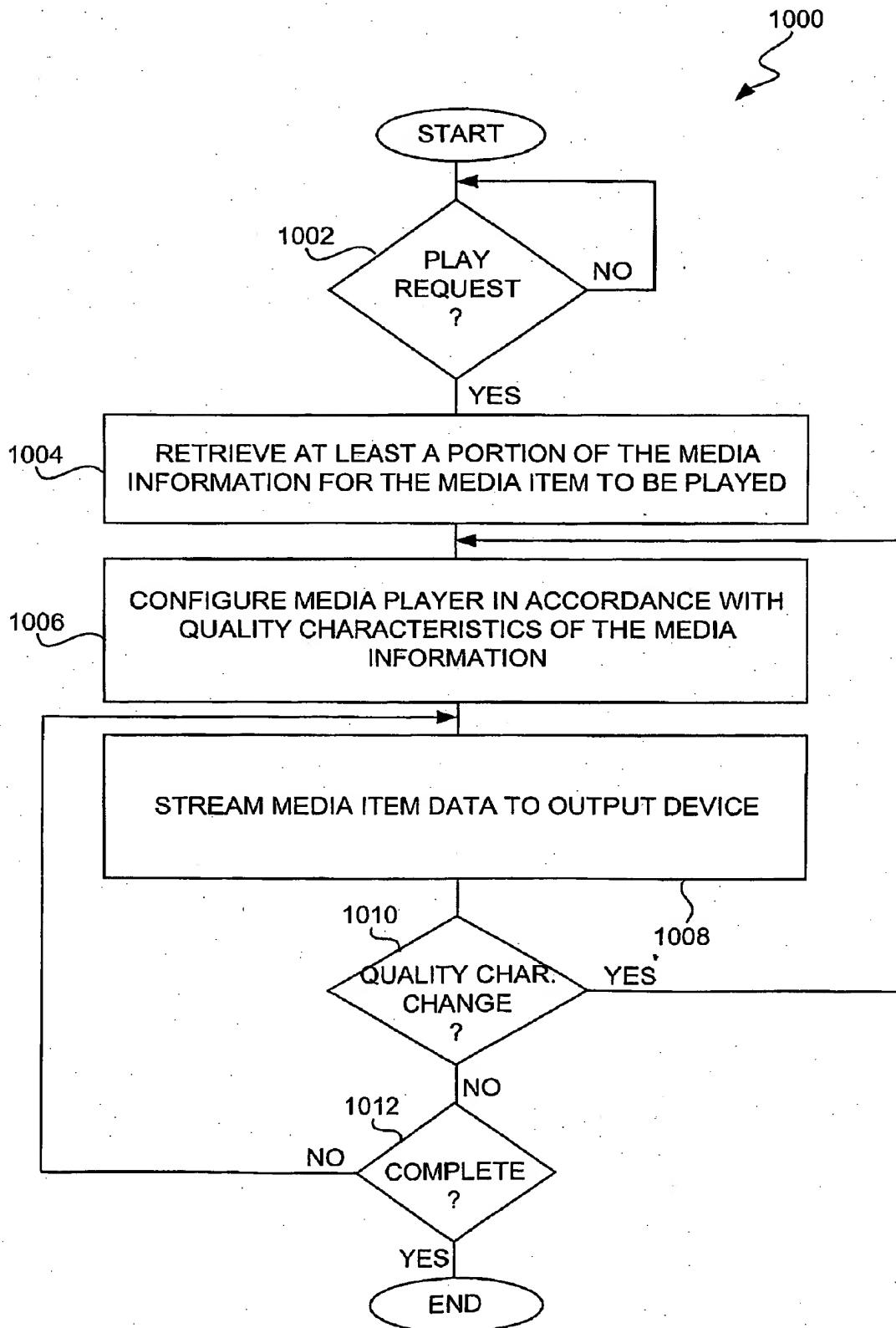


FIG. 10

12/12

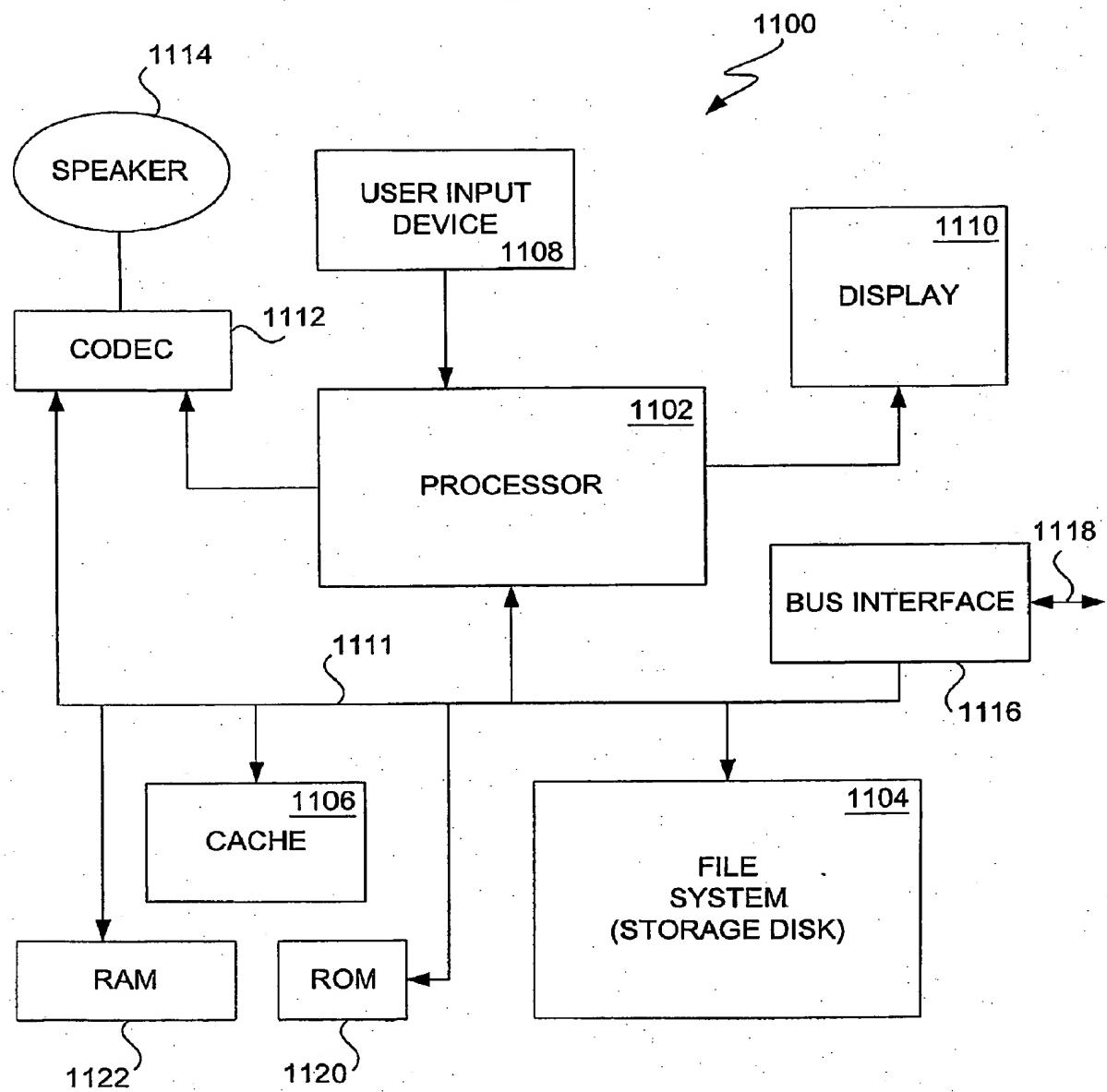


FIG. 11